IN THE CLAIMS:

Please cancel claim 28 without prejudice and amend the claims as follows:

1. (Currently Amended) A method for determining shallow water flow risk using seismic data, comprising:

applying a pre-stack waveform inversion on the seismic data at a selected control location to provide an elastic model, wherein the elastic model comprises pressure-wave velocity and shear-wave velocity;

applying a post-stack inversion on the seismic data using the elastic model to determine the shallow water flow risk over a 3D volume, wherein the post-stack inversion is performed using an AVO intercept and a pseudo shear-wave data volume;

computing a ratio between the pressure-wave velocity and the shear-wave velocity; and

identifying shallow water flow risk areas based on the pressure-wave velocity to the shear-wave velocity ratio.

2. (Original) The method of claim 1, wherein the seismic data comprises seismic data selected from the list consisting of one-dimensional seismic data, two-dimensional seismic data, and three-dimensional seismic data.

3. (Original) The method of claim 1, wherein the elastic model further comprises attributes selected from the list consisting of density, Poisson's ratio, and Lamé elastic parameters.

4. (Original) The method of claim 1, further comprising processing the seismic data to enhance its stratigraphic resolution.

5. (Original) The method of claim 4, wherein the processing the seismic data comprises sub-sampling the seismic data to less than two millisecond intervals.

6. (Original) The method of claim 4, wherein the processing the seismic data comprises using an algorithm with an amplitude preserving flow.

7. (Original) The method of claim 4, wherein the processing the seismic data comprises using an algorithm selected from the list consisting of a pre-stack time migration, accurate velocity normal-moveout correction, and noise removal algorithms.

8. (Original) The method of claim 1, wherein the control location comprises a plurality of control locations.

9. (Original) The method of claim 1, further comprising selecting a control location within the seismic data.

10. (Original) The method of claim 9, wherein selecting the control location within the seismic data comprises performing a stratigraphic analysis on the seismic data to determine the control location.

11. (Original) The method of claim 10, wherein performing the stratigraphic analysis comprises developing a geologic model.

12. (Original) The method of claim 11, wherein performing the stratigraphic analysis comprises identifying the control location by using the geologic model to identify a geologic feature selected from this list consisting of faults, blow-outs, bioherms, chaotic facies, cones, diapers, domes, gas vents, gas mounds, mud volcanoes, popckmarks, scarps, slumps, channels, slope fan deposition, and bottom simulator reflectors.

13. (Original) The method of claim 9, wherein selecting the control location within the seismic data further comprises evaluating the seismic attributes of the seismic data.

14. (Original) The method of claim 13, wherein evaluating the seismic attributes comprises using amplitude-variation-with-offset attributes, comprising intercept and gradient.

15. (Previously Presented) The method of claim 13, wherein evaluating the seismic attributes comprises evaluating polarity changes in reflection coefficient.

16. (Original) The method of claim 1, wherein the pre-stack waveform inversion comprises a full pre-stack waveform inversion.

17. (Original) The method of claim 1, wherein the pre-stack waveform inversion comprises applying a genetic algorithm.

18. (Original) The method of claim 16, wherein the genetic algorithm comprises:

generating a plurality of elastic earth models;

generating pre-stack synthetic seismograms for the elastic earth models;

matching the generated seismograms with the seismic data;

generating a fitness for the elastic earth models;

genetically reproducing the elastic earth models using the fitness for the elastic earth models; and

determining convergence of the reproduced elastic earth models to select the elastic model.

19. (Original) The method of claim 18, wherein the plurality of elastic earth models comprises a random population of the elastic earth models.

20. (Original) The method of claim 18, wherein generating pre-stack synthetic seismograms for the elastic earth models comprises using an exact wave equation comprising mode conversions and interbed multiple reflections.

21. (Original) The method of claim 18, wherein matching the generated seismograms with a plurality the seismic data further comprises matching normal

moveout of the generated seismograms and the seismic data, and matching reflection amplitudes of the generated seismograms and the seismic data.

22. (Original) The method of claim 18, wherein genetically reproducing the elastic earth models using the fitness for the elastic earth models comprises:

reproducing the elastic earth models in proportion to the elastic earth models fitness;

randomly crossing over the reproduced elastic earth models; and

mutating the reproduced elastic earth models.

23. (Currently Amended) The method of claim [[1]]26, ~~further comprising applying a~~ wherein the application of the post-stack inversion on the seismic data using the elastic model is used to determine the shallow water flow risk over a 3D volume.

24. (Currently Amended) The method of claim [[1]]26, wherein the post-stack inversion is performed using an AVO intercept and a pseudo shear-wave data volume.

25. (Original) The method of claim 1, wherein shallow water flow risk is identified when the pressure-wave velocity compared to the shear-wave velocity is between approximately 3.5 and approximately 7.

26. (Previously Presented) A computerized method for determining shallow water flow risk using seismic data comprising:

processing the seismic data to enhance its stratigraphic resolution;

selecting a control location comprising:

performing a stratigraphic analysis on the seismic data; and

evaluating the seismic attributes of the seismic data;

applying a pre-stack waveform inversion on the seismic data at a selected control location to provide an elastic model, wherein the elastic model comprises pressure-wave velocity and shear-wave velocity;

applying a post-stack inversion on the seismic data using the elastic model; and

computing a ratio between the pressure-wave velocity and the shear-wave velocity based on the post-stack inverted elastic model to determine the shallow water flow risk.

27. (Original) The method of claim 26, wherein the pre-stack waveform inversion comprises using a genetic algorithm comprising:

generating a plurality of elastic earth models;

generating pre-stack synthetic seismograms for the elastic earth models;

matching the generated seismograms with the seismic data;

generating a fitness for the elastic earth models;

genetically reproducing the elastic earth models using the fitness for the elastic earth models; and

determining convergence of the reproduced elastic earth models to select the elastic model.

28. (Cancelled)